

About this Issue of the Newsletter: ...or should we call it a “yearbook”? We apologize for being missing in action for the last several months. But, to paraphrase the famous line: We’re baaack! The newsletter may have paused, but the Aeronomy Lab’s activities were at full throttle. So, we’ve expanded this issue. And, we’ve taken the opportunity to experiment with color and to use more than the usual amount of graphics. We hope you enjoy the result.



AWARDS AND RECOGNITION



A Department of Commerce group Gold Medal was awarded to the NOAA scientists who were Lead Authors of the 2001 international assessment of climate science of the Intergovernmental Panel on Climate Change (IPCC). They are: **Dan Albritton**, Ed Dlugokencky (CMDL), Tom Karl (NESDIS), **Dan Murphy**, V. Ramaswamy (GFDL), **Susan Solomon**, and Ron Stouffer (GFDL). The IPCC assessment is relied upon by decisionmakers as the definitive source of state-of-the-art, objective information on the science related to climate.



Tom Ryerson was awarded the Department of Commerce Silver Medal in 2002. The award recognizes Tom’s research on how air quality is affected by the emissions from the Nation’s power-generating plants and petrochemical facilities. Such scientific information will underpin industry and government efforts to plan for future energy needs, as well as to identify the most effective approaches to improving air quality.



Steve Brown received the 2003 CIRES Outstanding Performance Award. He was recognized for his work in pioneering the use of the cavity ring-down spectroscopic technique to make measurements of trace atmospheric constituents in applications of societal significance. He received the award on April 21.



The OAR Awards Ceremony on April 17 was an occasion of extreme pride for the Aeronomy Lab. A NOAA Research (OAR) “Employee of the Year” group award

was bestowed upon the entire secretarial team of the Aeronomy Lab: **LeAnn Droppleman, Kathy Green, Babs Herli, Barb Keppler, Karen Layman, Suzie Milano-Schoser, and Jeanne Waters**. The award recognized the team’s outstanding administrative support during a very busy and productive year for the Aeronomy Lab. Thanks to their efforts, the Lab was able to complete its (perhaps record-breaking) streak of multiple field missions during 2002. Present to accept the award in Silver Spring, Maryland, were Jeanne, Karen, Suzie, and Babs.



Jeanne, Babs, Suzie, Karen, LeAnn, Kathy, and Barb (with Ravi and Dan, who presented the award and made the nomination, respectively.)



David Fahey was named Fellow of CIRES in February. Forty-one scientists from several University departments and NOAA laboratories and centers form the CIRES Council of Fellows, which helps to set the interdisciplinary research directions of the Institute. George Reid, Fred Fehsenfeld, and Susan Solomon are also CIRES Fellows.



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Awards and Recognition continued

Three papers by Aeronomy Laboratory scientists have been honored with the 2002 NOAA/OAR Outstanding Scientific Paper Award. CIRES coauthors received matching awards this year in a new program initiated by CIRES. The papers are:

Wotawa, G., and M. Trainer, The influence of Canadian forest fires on pollutant concentrations in the United States, *Science* 288, 324-328, 2000.

Ryerson, T.B., M. Trainer, J.S. Holloway, D.D. Parrish, L.G. Huey, D.T. Sueper, G.J. Frost, S.G. Donnelly, S. Schauffler, E.L. Atlas, W.C. Kuster, P.D. Goldan, G. Hübler, J.F. Meagher, and F.C. Fehsenfeld, Observations of ozone formation in power plant plumes and implications for ozone control strategies, *Science* 292, 719-723, 2001.

Seidel, D.J., R.J. Ross, J.K. Angell, and **G.C. Reid**, Climatological characteristics of the tropical tropopause as revealed by radiosondes, *Journal of Geophysical Research* 106, D8, 7857-7878, 2001.

In addition, NOAA Research gave an honorary Outstanding Scientific Paper Special Award to the organizations and individuals who led the preparation of the 1998 international scientific assessment of ozone-layer depletion. Recognized with the award were: Aeronomy Lab (**D. Albritton, J. Daniel, C. Ennis, C. Granier, R. Portmann, A.R. Ravishankara**); Air Resources Lab (D. Seidel); Climate Monitoring and

Diagnostics Lab (J. Butler, J. Elkins, D. Hofmann, S. Montzka, P. Novelli); Geophysical Fluid Dynamics Lab (V. Ramaswamy); and the Cooperative Institute for Research in Environmental Sciences (CIRES).



In October, **Ravi** completed a two-week lecture tour as the 2003 Centenary Lecturer for the Royal Society of Chemistry of Great Britain. Ravi is the first scientist in atmospheric chemistry to be named to this honor. He spoke at six U.K. universities about atmospheric chemistry issues important in climate, air quality, and ozone-layer depletion.



In November 2002, **Susan Solomon** was named by *Discover Magazine* as one of the 50 most extraordinary women in all of the sciences. Of her 1986 leadership of the National Ozone Expedition to Antarctica, the magazine quotes her as saying, "I was a theoretician at the time and sat in my nice warm office with my keyboard. But I was young and foolish, and it sounded like a great adventure." The rest, as they say, is history. A second honor occurred in May, when Susan received an honorary doctorate from the University of Miami.



HOME and AWAY

Adding a Chemistry Dimension to the Winter Storms Mission: During January and February of 2003, members of the Aeronomy Laboratory made in-situ measurements from the NOAA Gulfstream IV-SP (G-IV) aircraft in piggyback mode as part of the Winter Storms Reconnaissance Mission, an annual NOAA mission conducted in support of the National Centers for Environmental Prediction. Megan Northway, Joost de Gouw, Bill Kuster, and Carsten Warneke deployed two in-situ instruments on the G-IV, an ozone monitor and a proton-transfer-reaction mass spectrometer (PTR-MS) for measuring volatile organic compounds (VOCs). The combined chemistry package served to help quantify ozone in the remote troposphere and to identify sources of chemical precursors to that ozone. Typical Winter Storms flights originated in and returned to Honolulu, Hawaii, cruising at altitudes of 41,000-45,000 feet for up to 8 hours over the remote Pacific Ocean.

Aircraft Operations Center Lends a Hand with AL Ozone Research: The Aeronomy Lab's Tropospheric Chemistry group and the NOAA Aircraft Operations Center are working together in ongoing research to measure ozone from the NOAA G-IV aircraft. An Aeronomy Lab ozone instrument has "hitched a ride" on the aircraft since summer. AOC personnel activate it whenever the G-IV flies (for example, during hurricane reconnaissance missions) and download the data for transfer to the Aeronomy Lab. The arrangement has proven to be a very cost-efficient way for the Aeronomy Lab to tap into a wealth of new data about ozone in the mid-to-upper troposphere. A major topic of investigation is the intrusion of ozone-rich air from the stratosphere into the troposphere during hurricanes or other meteorological events. Such stratosphere-troposphere exchange can be an important source of global

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NOAA Air Quality Research Yields Big Savings—“Texas-Style”

Air quality investigations conducted by NOAA Research scientists and colleagues have resulted in big savings for the State of Texas—of both dollars and jobs. Air quality officials in that state have now communicated in a letter to Vice Admiral Lautenbacher that the savings “would not have been possible” without the scientific understanding generated by NOAA Research.

The savings were indeed “Texas-sized.” It is estimated that by the year 2010, \$10B and 65,000 jobs will have been saved by the State’s revisions of their air quality management plan, according to an independent economic analysis by the University of Chicago and University of Houston. The revisions were made based on NOAA’s discoveries of previously unexpected factors that cause the Houston area to experience the highest ozone levels in the nation.

The research findings resulted from a major field experiment conducted in the Houston region during the year-2000 Texas Air Quality Study (TexAQS 2000). Aeronomy Laboratory research during the study identified unexpectedly high amounts of reactive hydrocarbons leaking from the petrochemical refineries that are prevalent in the Texas Gulf Coast region. These fugitive emissions combine with other gases in the atmosphere to make pollutant ozone—in huge quantities. Indeed, Houston experiences some of the highest ozone pollution levels in the country.

Prior to the field campaign, Texas air quality officials had been considering several options to try to meet pending deadlines for attaining the national ambient air quality standards in the Houston region. An economic study by the University of Chicago/University of Houston provided the information on how their decision would affect the “bottom line” for the State. The Aeronomy Laboratory’s TexAQS-2000 scientific findings pointed the way to the most effective approach. The result was a win-win decision, because the most effective environmental approach was also the most cost efficient of all the options, according to the economic study. The situation puts NOAA in the rare and remarkable situation of having a tailored independent economic analysis of the benefits of their scientific research available—hence the very tangible translation of NOAA scientific discoveries into numbers of dollars and jobs saved for the State of Texas.

The results were welcomed by petrochemical industry officials, who have been able to achieve production economies because of the insights that NOAA’s research provided.

TexAQS-2000 was the largest air quality study ever done in the State of Texas. Up to 250 researchers studied air quality (ozone and fine particles, and their precursors) in a broad region of eastern Texas from August 15-September 15, 2000. Six different research aircraft and over 20 ground stations were used in the multi-agency effort, which was coordinated by the Texas Natural Resource Conservation Commission (now called the Texas Commission on Environmental Quality) and conducted in partnership with NOAA, the Department of Energy, the National Aeronautics and Space Administration, the National Center for Atmospheric Research, other agencies, and universities. NOAA Research Laboratories that contributed to the effort were the Aeronomy Laboratory, the Environmental Technology Laboratory, the Climate Monitoring and Diagnostics Laboratory, and the Forecast Systems Laboratory.

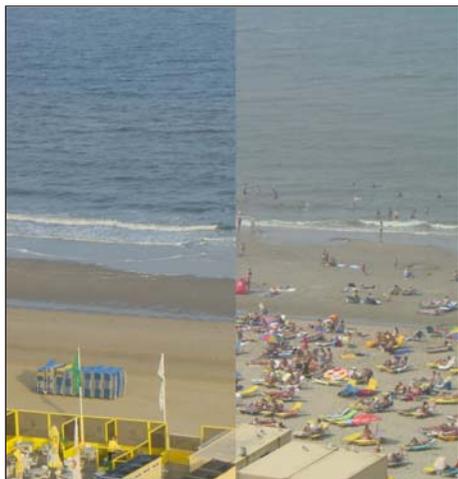


And the State of Texas Asks NOAA for an Encore... in “Houston and Beyond”

The success of the year-2000 air quality field study in Texas has prompted that state’s air quality officials to invite NOAA back for a more comprehensive look. A 2005/2006 field study is being envisioned as the next step in advancing the scientific understanding of air quality not only in the Houston region, but in several other urban areas of Texas. NOAA’s involvement would come primarily in a 2006 intensive segment of the field work. Aeronomy Laboratory scientists Fred Fehsenfeld and Jim Meagher have been involved throughout 2002 and 2003 in meetings with the Texas Commission on Environmental Quality (TCEQ) and the Texas Environmental Research Consortium (TERC) to discuss possibilities and plans. A wider planning meeting will occur on February 3 and 4 to discuss a strawman scientific plan for the field work. Also, Jim Meagher is a member of the Science Advisory Committee of the TERC, which is seeking to direct resources to highest priority research needs regarding Houston’s air quality. The ongoing dialogue between Aeronomy Lab scientists and Texas air quality officials is building a firm foundation for scientific research that will be precisely tailored to meet the State’s future decisionmaking needs in the air quality arena.

Aeronomy Lab Research Uncovers a “Weekend Effect” in Daily Temperature Range

Scientists at the Aeronomy Laboratory have discovered a weekend/weekday difference in the diurnal temperature range (daily high minus daily low) for many ground stations in the U.S., Mexico, Japan, and China — something that is “necessarily human in origin,” according to authors Piers M. de F. Forster (visiting the Aeronomy Laboratory from the University of Reading) and Susan Solomon. Their paper was published in the 16 September 2003 issue of the *Proceedings of the National Academy of Sciences*.



Piers and Susan examined 40-plus years of data reported by thousands of stations (about 5,000 stations in the U.S., and about the same number of stations in other countries (Japan, Mexico, China)). Their particular focus was to look at any changes in the diurnal temperature range. The 2001 state-of-scientific-understanding climate assessment of the Intergovernmental Panel on Climate Change (IPCC) pointed out that this range has narrowed over the past decades, with the nightly minimum having risen more than the daytime maximum. This range is being watched carefully as an important indicator of climate change.

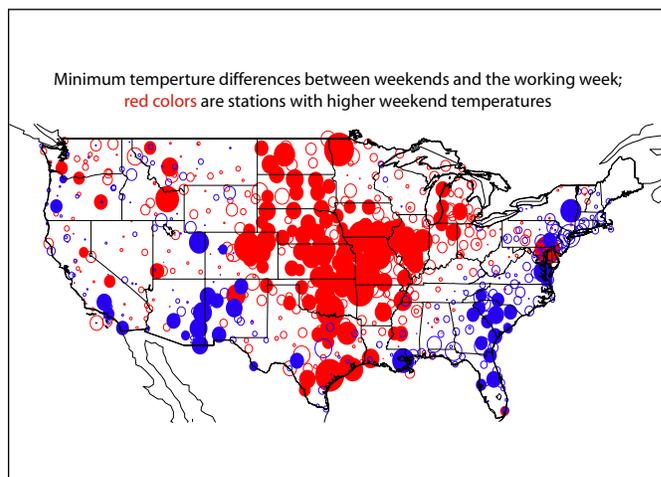
Piers and Susan found that the diurnal temperature range had a pronounced weekly cycle in many regions.

The range was in some cases up to 0.5 degrees Celsius (nearly 1 degree Fahrenheit) different for the average of Saturday through Monday, versus the average for Wednesday through Friday. About 35% of the stations exhibited this “weekend effect.” The behavior was closely linked to changes in the nighttime minimum temperature (see figure). However, the sign of the effect wasn’t universal. Seasonal differences were also seen in the magnitude of the effect.

The authors suggest possible mechanisms behind the effect. For example, a likely candidate is weekend/weekday differences in how human activities influence aerosols, and hence clouds and ultimately radiation patterns. Further research will be needed to isolate the specific anthropogenic mechanisms underlying the authors’ discovery.

But a human influence is unmistakable in the finding; as Piers notes, “...we don’t have something in nature that cares whether it’s Tuesday or Saturday.” The discovery of the weekend effect in the diurnal temperature range is thus noteworthy as a climate indicator.

The range was in some cases up to 0.5 degrees Celsius (nearly 1 degree



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tropospheric ozone, which is a greenhouse gas and therefore an important climate factor. Dave Parrish, Bill Kuster, and Donna Sueper are collaborating on the project. At last count, the ozone instrument (built by Roger Jakoubek) had flown on five different missions of the G-IV: Winter Storms 2001, 2002, and 2003; “Hurricanes 2003,” and the current flights occurring during the Atlantic THORPEX Observing System Test, which is a part of a research effort to improve weather forecasts.

High-Tech Cloud Watching in Oklahoma: The water and ice in clouds have important effects on atmospheric radiation, climate, and weather. Scientists in the Aeronomy

Lab’s Chemistry and Climate Processes group traveled to the Department of Energy (DOE) Southern Great Plains Site in Lamont, Oklahoma, for a premier opportunity to compare their near-infrared spectrometer’s cloud liquid water and ice estimates to the data gathered by other types of instruments. For two weeks in late October 2003, the group looked at scattered sunlight in the 1-1.7 micron near-infrared (NIR) region during cloudy sky/clear sky conditions. DOE instruments onsite included a microwave radiometer as well as a long-wavelength interferometer. In addition to making a general comparison between the liquid estimates from the spectral observations and those made by the microwave radiometer, researchers John Daniel, Andy Langford, Susan Solomon, Roy Miller, and

HOME and AWAY continued

Chuck Eubank were especially interested in seeing if their NIR spectrometer demonstrated a higher sensitivity to thin clouds, which cause difficulties for some other instrumental approaches. The AL instrument is also sensitive to the presence of ice in cirrus clouds, yielding another point of comparison with the other instruments. The analysis of data from the two-week experiment is underway.

The IPCC has identified clouds and their effects on radiation and their role in the hydrological cycle as one of the largest uncertainties in climate science. In addition, the liquid/ice partitioning in clouds is an important parameter of models used in weather forecasting. There are potential applications for the information in aviation safety as well. The NIR technique is a sensitive, compact, and inexpensive way of making a direct measurement of liquid water and ice absorption, and it could eventually be suitable for satellite platforms. The Aeronomy Lab has been developing the technique over the last four years in the laboratory, in ground-based measurements in Boulder, and in deployments on the NOAA WP-3D and G-IV aircraft. Collaborations with scientists Wendi Madsen in the Environmental Technology Lab (ETL) and Ellsworth Dutton in the Climate Monitoring and Diagnostics Lab (CMDL) have focused on the quantitative assessment of



Cirrus cloud viewed through the sunshield of the Aeronomy Lab's near-infrared spectrometer.

the liquid-water retrievals from the spectral observations.

AL Precipitation Research, Southern Style: The Tropical Dynamics and Climate group has been doing collaborative precipitation research throughout 2003 with the University of Miami. Christopher Williams has installed the group's 2835 MHz S-band profiler in Florida, near the University's 95 GHz profiler. The researchers are investigating multi-frequency techniques for the retrieval of precipitation drop-size distributions from the profilers' signals.

On the Horizon...

The *Tropical Dynamics and Climate* group will participate in the NOAA/Environmental Technology Laboratory (ETL) Pacific Land-falling Jets Experiment campaign this year. **PACJET** is an ongoing program that observes synoptic-scale storms that impact the coast of California during winter months. These storms are often accompanied by heavy rainfall along the coast and by snow inland, and they are important to the water resources of the region. The field research is designed to increase the scientific understanding of these powerful and often destructive storms, and to test the use of new observing systems and products to aid National Weather Service (NWS) forecasters. The Aeronomy Laboratory will locate one of their S-band profilers north of San Francisco for the campaign, which takes place from December 2003 to March 2004.



Nearly the entire *Meteorological Chemistry* group will participate in the **Aura Validation Experiment** to be held in January 2004 (AVE-04). The Earth Observation Satellite (EOS) Aura is a NASA satellite, scheduled for launch in January, that will carry multiple instruments measuring a wide variety of gases and aerosol parame-

ters important to studies of Earth's ozone layer, air quality, and climate. The three-week AVE-04 mission will involve the WB-57 aircraft flying from Houston and from San José, Costa Rica, to acquire data for the validation of the satellite retrievals from the Aura instruments. Other AVE-04 objectives include investigating stratosphere-to-troposphere exchange of air and characterizing the tropical tropopause layer. AL scientists Dan Murphy, Ken Kelly, Erik Richard, Tom Thompson, Ru-Shan Gao, and Dave Fahey are the Principal Investigators for six instruments that will measure gases, particle composition, pressure, and temperature. In addition, Karen Rosenlof will contribute to meteorological and flight planning support and David Fahey will be co-Project Scientist. Many other group members will contribute.



The *Meteorological Chemistry* group and *Tropospheric Chemistry* group will join forces in an April 2004 experiment at Storm Peak Observatory near Steamboat Springs, Colorado. The goal of the **Storm Peak Ice Nucleation Study** is to determine which kinds of particles serve as effective nuclei for ice formation and, ultimately, to improve the capability to predict cloud formation

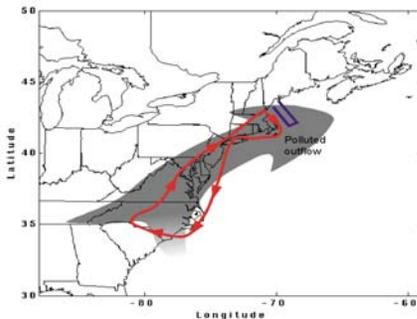
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On the Horizon continued

processes. The Particle Analysis by Laser Mass Spectrometry (PALMS) instrument will be deployed by Dan Cziczo, Paula Hudson, Dave Thomson, and Dan Murphy to determine the chemical makeup of individual particles that initiate ice nucleation. Eric Williams will contribute instrumentation to make measurements of the carbon monoxide and sulfur dioxide content of the sampled air, information that will help to characterize the types of air masses that are being sampled by the PALMS instrument. The work expands on a 2001 study at this same mountaintop location, which sits at high elevation (10,500 feet) and experiences both clean-air masses and polluted air. Scientists at Colorado State University are again collaborating in the effort.

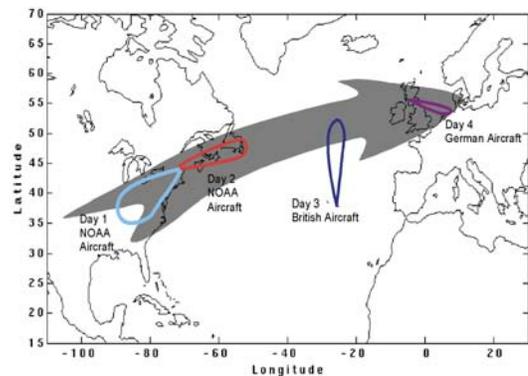


The *Aeronomy Lab* is heavily involved in an upcoming joint air-quality/climate experiment that NOAA is planning for summer of 2004, the **New England Air Quality Study (NEAQS) - Intercontinental Transport and Chemical Transformation (ITCT) 2004** mission. The 2004 NEAQS study is aimed at investigating the factors that influence air quality in the New England region. It will build on the groundwork laid by the highly successful NEAQS “scoping” study of summer 2002. NEAQS-2004 will involve researchers on a fully instrumented NOAA WP-3D aircraft, on the NOAA R/V *Ronald H. Brown*, and at ground sites in the New England region. Collaborations are extensive on the mission. Within NOAA Research, seven Labs are participating (AL, AOML, CMDL, ETL, FSL, GFDL, PMEL), and NWS colleagues will use the data to evaluate NOAA’s air quality forecast model. External partners include the University of New Hampshire and the Cooperative Institute known as AIRMAP (Atmospheric Investigation, Regional Modeling, Analysis, and Prediction), other academia, and federal and state agencies.



The ITCT-2004 mission will run concurrently with NEAQS-2004, giving “more research bang for the buck” by simultaneously accomplishing the climate-related objectives of that campaign. ITCT is a major research

activity of the International Global Atmospheric Chemistry (IGAC) program that addresses the tropospheric chemistry, radiative properties, and long-range transport of ozone, fine particles, and other climate-relevant constituents of the atmosphere. In 2004, ITCT will test and improve the understanding (and hence model predictions) of the transport and transformation processes that occur as climate-related emissions from northeastern North America travel eastward, across the North Atlantic Ocean. The study will also investigate how atmospheric chemical composition affects the absorption and scattering of sunlight. The joint implementation of NEAQS and ITCT in 2004 recognizes the strong linkages between their scientific issues, since many of the chemical and meteorological processes are significant factors in both air quality and climate.



The *Tropical Dynamics and Climate* group will participate in two field efforts in summer 2004. The group is collaborating with the Environmental Technology Laboratory (ETL) on the North American Monsoon Experiment (**NAME**) field campaign, which will take place in Mexico. The North American monsoon system is responsible for much of the warm-season precipitation that occurs in Mexico and the southwest U.S. The Aeronomy Lab will participate in the analysis of data collected from wind profilers deployed for NAME during the summer of 2004. The TD & C group will also lead an effort to investigate the microphysics of monsoon precipitation at two sites in Mexico, one on the coast and the other located inland on elevated terrain. The TD & C group continues to be active with NASA’s ongoing satellite-based precipitation missions as the Tropical Rainfall Measuring Mission (**TRMM**) evolves into the Global Precipitation Mission (**GPM**). The Aeronomy Laboratory effort is focused on ground validation of the satellite precipitation estimates using ground-based precipitation profilers. The group plans to team up with NASA researchers in 2004 for joint field measurements at NASA’s Wallops Island field site.



WHAT'S UP WITH PEOPLE

In the *Atmospheric Chemical Kinetics* group, **Katia Lukhovitskaya** visited for two months beginning September 2003 to work on soot experiments with the group. Katia is a graduate student at Moscow State University in Russia. **Bill Dubé** joined in June 2003 after serving NIST for over 20 years. Bill is working with Steve Brown on instruments used in air quality studies on the WP-3D aircraft. Also in June 2003, **Raja Kumar** joined ACK as a postdoc from the Indian Institute of Science in Bangalore, India. In June and July of 2003, **Maya Nunley** came under the Educational Partnership Program with Minority Serving Institutions program to work with Steve Brown on the cavity ring-down spectrometer. She is a senior chemistry major at Clark Atlanta University. **Tomasz Gierczak** was a visiting scientist for the summer of 2003 and returned to his teaching position at the Warsaw University in Poland. **Karl Froyd** left in January 2003 to take a postdoc position at NCAR in Boulder. **Elena Jimenez** also left in January to return to her teaching position at the University of Castilla-La Mancha, Spain. **Veronique Riffault**, who received her Ph.D. from Orleans University, joined the group in December 2002 as a postdoc. **Tahllee Baynard** joined the group in September 2002 as a postdoc. Tahllee received his Ph.D. from the University of Chicago and is studying aerosol chemistry.

In October 2003, **Piers Forster** returned to the University of Reading, U.K., after a one-year scientific visit with the

Chemistry & Climate Processes group. He will return in fall of 2004 for another visit. **Amy Hawes** left the group in July 2003 to attend graduate school at Colorado State University in Fort Collins. **John Daniel** went to New Zealand from October 2002 to March 2003, to collaborate with colleagues at the University of Otago and the National Institute for Water and Atmospheric Research. **Bernie Sierk** left in October 2002 to move to the Institute of Environmental Physics at the Universität Bremen in Germany, where he works with former Aeronomy Lab employee, John Burrows.

In the *Director's Office*, **Joan Brundage** joined the Computing and Networking Resources Group (CNRG) as Program Leader and Senior Information Technology Manager/CIO for the Aeronomy Lab in October 2003. Joan was formerly with FSL as Deputy CIO. **Jenny Fox** joined CNRG in March 2003 as a research assistant, splitting her time between CNRG and data modeling for George Kiladis in the *Tropical Dynamics & Climate* group. **Christy Sweet** was on special assignment from September 2002 to March 2003 to assist in editing of the 2002 international ozone-layer assessment for the U.N. Montreal Protocol.

In the *IPCC Working Group I Technical Support Unit*, **Tahl Kestin** began in July 2003 as a project scientist. **Scott**

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Dan Albritton Serves as Acting Assistant Administrator of NOAA Research

From mid-March through early June 2003, Dan Albritton served as Acting Assistant Administrator (AA) of NOAA Research and was located in Silver Spring, Maryland. Overlapping with Dan's assignment were Sandy MacDonald (Director, Forecast Systems Laboratory) serving as Acting Deputy Assistant Administrator (DAA) from mid-January through mid-April, and Ernie Hildner (Director, Space Environment Center) serving as Deputy AA from mid-April through mid-June. Ravi was Acting Director of the Aeronomy Lab during Dan's absence.

The NOAA Research Laboratory and Center Directors offered to fill in at Headquarters during a several-month time period. The September 2002 departure of David Evans as AA and the maternity leave of Louisa Koch (DAA of NOAA Research) prompted the offer. Dan's three-month assignment was one of a series of assignments that brought Sandy, Ernie, Steve Brandt (Director, Great Lakes Environmental Research Laboratory), and Jeff Kimpel (Director, National Severe Storms Laboratory) to Silver Spring to serve in the AA and DAA roles. Louisa returned in August, and Rick Rosen took over as the new AA of NOAA Research in October (see related box on page 8).

During Dan's tenure as Acting AA, Headquarters completed several major actions. The Fiscal Year-2004 budget was described to Congressional members and their staff in several briefings. The FY05 budget was in earlier stages of the process, in which Dan and others briefed NOAA management on draft plans. Added to these budget process activities were the many day-to-day issues within NOAA Research.

Dan declared the assignment a "valuable learning experience" that strengthened his appreciation for the work done at Headquarters on behalf of all of NOAA Research. Headquarters staff expressed sincere thanks for Dan's service during the three months, and the Aeronomy Lab enthusiastically welcomed his return to Boulder.

What's Up with People continued

Longmore, appointed as associate scientist, joined in December 2002. **Martin Manning** joined as Director of the Technical Support Unit in October 2002.

In the *Meteorological Chemistry* group, **Troy Thornberry** joined in September 2003 as a postdoc working with Dan Murphy. Troy received his Ph.D. from the University of Michigan. **Wink (Dick Winkler)** retired in November 2002, after 38 years of service. Wink will continue to provide occasional engineering support to the Met Chem group. CU-Boulder undergraduate **Matt Phillips** came to the group last summer under the Practical Hands-On Application to Science Education (PHASE) program and is continuing with the group as a research assistant.

In the *Theoretical Aeronomy* group, **Sabine Eckhardt** joined the group in September 2003 as a graduate student from the Technical University of Munich to work with **Andreas Stohl**, who rejoined the group in July 2003. Andy, a CIRES visiting scientist, is interpreting results of recent field experiments. In August 2003, **Susan McCaffery** left the group upon accepting a job with Geomega, an environmental consulting group in Boulder. Upon completing her doctoral work, **Alison Grimsdell** left in June 2003.

In the *Tropical Dynamics & Climate* group, **Eileen McKim** and **Paul Roundy** joined in Fall 2003 and both are working with George Kiladis. Eileen is a graduate student at CU-Boulder who will focus her studies on the North American monsoon. Paul is a post-doctoral scientist in meteorology from Pennsylvania State University. **Melissa Burt** is a protégé in the Significant Opportunities in Atmospheric Research and Science (SOARS) program and is a student at Millersville University in Pennsylvania. Leslie Hartten mentored Melissa over the 2003 summer months. **Patrick Haertel** left in July 2003 to take a faculty position in the Department of Atmospheric Sciences at the University of North Dakota in Grand Forks. In May 2003, we saw two retirements: **Wally Clark**, who served 38 years, and **Carl Love**, who served 42 years. Wally is continuing his work

with the Lab on a part-time basis. **Paul Johnston** took a 5-week tour beginning in February 2003 to the Pacific radar sites at Kwajalein, Nauru, Tarawa, and Manus to complete the Tropical Pacific Profiler Network (TPPN) research at these sites. **Ahoro Adachi** spent a one-year visit with the group, beginning in November 2002, to study wind profiler techniques. He returned in late November 2003 to the Meteorological Research Institute of the Japan Meteorological Agency. **Tom Freestone** left in August 2002 to complete his undergraduate degree at CU-Boulder.

In the *Tropospheric Chemistry* group, **Adam Wollny** joined in October 2003 as a post doc and is working with Chuck

Brock. Adam earned his Ph.D. in physics from the Universität Frankfurt in Germany. In September 2003, **Frans Harren** joined the group as a visiting professor from University of Nijmegen in The Netherlands. He is working with Joost deGouw. In May 2003, **Brian Lerner** joined the group as a postdoc from CU-Boulder. In January 2003, **Dennis Nicks** left to take a position at Ball Aerospace, and **Katherine Perkins** left to start a postdoctoral position in science education research with Nobel Laureate Carl Wieman in the Physics Department at CU-Boulder. In December 2002, **Brendan Matthew** joined the group as a postdoc. Brendan earned his Ph.D. in Agri-

cultural and Environmental Chemistry from the University of California at Davis. **Rachael Hilberman** worked with the group from November 2002 to July 2003 as a research assistant. She now attends graduate school in oceanography at Oregon State University in Portland. **Marco Steeghs** arrived in September 2002 and left in April 2003. He came as a visitor and graduate student from the University of Nijmegen in the Netherlands to learn about the proton-transfer-reaction mass spectrometer. **Ed Dunlea** left in August 2002 to complete a postdoc in Luisa and Mario Molina's laboratory at the Massachusetts Institute of Technology in Boston.

*We wish everyone the best in their new endeavors,
whether here or elsewhere!*



Rick Rosen Takes the Helm at NOAA Research

On October 7, Richard D. Rosen became the new Assistant Administrator of NOAA Research. Dr. Rosen was most recently vice president and chief scientist at Atmospheric Environmental Research, Inc., a Massachusetts research and development company. A major area of his scientific studies has been the investigation of large-scale atmospheric dynamics. He is a past president of the American Meteorological Society. Dr. Rosen has a long association with NOAA. He has carried out many research efforts collaborative with NOAA, and he has served as a member of NOAA's federal advisory body, the Science Advisory Board. In his remarks at an informal welcoming reception at NOAA Research Headquarters, Dr. Rosen praised the research and contributions made by NOAA scientists, and he said he looked forward to working in the best interests of NOAA Research, NOAA, and the larger research community.



To Decisionmakers: Dan Albritton attended a meeting with the NOAA Research Laboratory Review Panel on October 22 in Silver Spring... Susan Solomon described the Working Group I activities of the Intergovernmental Panel on Climate Change (IPCC) to the Financial Operations Group of the U.S. Climate Change Science Program on October 8. She also spoke on that topic at the 18th Meeting of the Subsidiary Body on Scientific and Technological Advice (SBSTA) of the United Nations Framework Convention on Climate Change (UNFCCC), held June 9-11 in Bonn, Germany. SBSTA is a multidisciplinary body of government representatives and experts charged with providing timely scientific and technological advice on matters relating to the Parties of the UNFCCC...

New EEO Coordinator for the Aeronomy Lab

Debe Dailey-Fisher is the new Equal Employment Opportunity (EEO)/Diversity Representative for the Aeronomy Laboratory. She takes over for Joanne Mordhorst, who served in this role for more than ten (!) years. We thank Joanne for her long tenure in this position and her many contributions to the NOAA EEO effort on behalf of the Lab (which included, among many achievements, a term as Chair of the OAR EEO Committee). Debe has hit the ground running in her new assignment, becoming the Vice-Chair of the Boulder Labs Diversity Council, taking leading responsibilities in organizing EEO/Diversity events in Boulder, and publishing (in September 2002) the first newsletter of the group.

Congressional science staffers visited NOAA-Boulder on August 6: Amy Carroll and Olwen Huxley (House Science Committee – Subcommittee on Environment, Technology, and Standards), and Ken LaSala and Chan Lieu (Senate Committee on Commerce, Science, and Transportation – Subcommittee on Science, Technology, and Space). Dan Albritton gave a briefing on climate change science... On May 16, Dan Albritton briefed Nancy Ragland Perkins, staffer for Sen. Judd Gregg, on NOAA’s research regarding air quality in the New England region. Jim Meagher provided followup materials requested by Ms. Perkins... On March 12, Andrea Richard (Area Representative for Sen. Wayne Allard) visited the David Skaggs Research Center. Dan Albritton participated in the discussions... Dave Parrish attended the 1st bilateral U.S. and European Union Joint Meeting on Climate Change Science and Technology, held February 5-6 in Washington, D.C. Participants iden-

tified cooperative research activities in six related areas... On January 16, Jim Meagher presented a summary of NOAA’s FY2003 air quality research activities/plans at the monthly meeting of the Air Quality Research Subcommittee (AQRS) of the Committee on Environment and Natural Resources (CENR)... Dan Albritton served as Science Advisor to the Montreal Protocol at the 14th Meeting of the Parties to the Montreal Protocol, held November 25-29, 2002, in Rome and at the July 7-11, 2003, Open-Ended Working Group Meeting in Montreal. Dan is one of four international Cochairs of the Protocol’s Scientific Assessment Panel. He presented the results of the Panel’s 2002 scientific assessment at those meetings and discussed future scientific information needs with the Meetings’ delegates... Several members of the Tropospheric Chemistry group and the Theoretical Aeronomy group attended a meeting of the Texas Natural Resource Conservation Commission (now the Texas Commission on Environmental Quality), held in Houston November 20-21, 2002, to discuss the science of air quality in that region of the country. At the meeting were Dave Parrish, Stu McKeen, Greg Frost, Michael Trainer, Tom Ryerson, Fred Fehsenfeld, and Eric Williams... In September and October 2002, Fred Fehsenfeld and Jim Meagher attended NARSTO meetings concerning the particulate matter assessment report for decisionmakers. Fred is lead author of a chapter in that report, on the topic of aerosol measurement capabilities. Fred attended a meeting held in Minneapolis for the lead authors of the assessment, which was published in February 2003. Jim attended the National Academy of Sciences presentation on the NARSTO Particulate Matter Assessment Review. NARSTO is the tri-national partnership of government, utilities, industry, and academia that coordinates and enhances policy-relevant scientific research and assessment regarding tropospheric pollution in North America... On September 20, 2002, Dan Albritton briefed officials of the Treasury Department’s Economic Policy Division on climate science “knowns and unknowns.” Officials with the Department of Transportation, the Office of the U.S. Trade Representative, the Council of Economic Advisors, and the Office of Science and Technology Policy were also present.

In Planning Meetings of NOAA or NOAA Research:

Dan Albritton attended meetings of the NOAA Climate and Global Change Panel held September 14-17 in Chicago, April 2-3 in Alexandria, Virginia, and November 14-15, 2002, in Washington, D.C. Dan also attended the NOAA Climate Program Retreat on July 25 in Washington, D.C... Ravi participated in a January 17 meeting of NOAA’s Climate Program held in Silver Spring, Maryland... Ken Gage participated in an OAR/NWS planning meeting on developing a testbed concept for hydrometeorology in

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Communicating Our Science continued

NOAA, held November 20, 2002, in Washington, D.C... Jim Meagher attended the Air Quality Forecasting meeting with NWS colleagues, July 29-30 in Washington, D.C. Fred Fehsenfeld, Jim Meagher, Stu McKeen, and Wayne Angevine attended an earlier planning meeting on that topic on November 7-8, 2002, in Silver Spring.

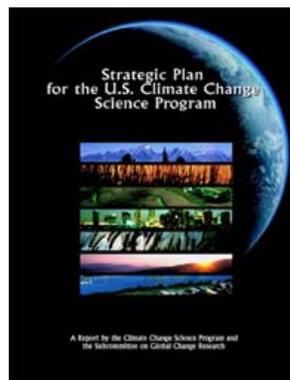
In Interagency Research Planning Meetings: Jim Meagher is serving on an interagency review panel, appointed by the National Academy of Sciences, that is helping to evaluate future atmospheric research directions within the Department of Energy. Dan Albritton gave informational briefings for the panel on aerosol research of the U.S. Climate Change Science Program (CCSP) and on NOAA's research regarding aerosols. The panel began its work in Fall 2003... Jim Meagher attended the April 29-May 1 Air Quality Forecasting Workshop, held in Houston and sponsored by the U.S. Weather Research Program. A primary workshop aim was the development of a science roadmap that will be used by USWRP stakeholder agencies as input to individual, but coordinated, agency plans and/or initiatives... In January, Dan Murphy participated in discussions of aerosol sensors for the future National Polar-Orbiting Operational Environmental Satellite System (NPOESS) at the Integrated Program Office, Washington, D.C... Aeronomy Lab scientists are very active in the interagency efforts associated with the U.S. Climate Change Science Program (CCSP). They contributed at several meetings in late 2002 and throughout 2003 on the development and review of the CCSP Strategic Plan. Please see the special box on this page for details.

To the Scientific Community: Venues included:

- *Scientific Conferences and Symposia:* Adrian Tuck participated in the Technical Analysis and Applications Center (TAAC) Conference on Unmanned Aerial Vehicles, held October 29-30, in Albuquerque... Ann Middlebrook and Dan Murphy gave presentations at the 22nd Annual Meeting of the American Association for Aerosol Research, held in Anaheim, California, on October 20-24... Susan Solomon gave a talk on "Timescales and processes in climate change: Some new directions," at the Norwegian Research and Technology Forum in Washington, D.C., October 7-8... Several members of the Aeronomy Lab were presenters and participants at the September 8-12 Gordon Conference on Atmospheric Chemistry held in Big Sky, Montana. Dave Fahey was a co-chair of the Conference, and Fred Fehsenfeld and Ravi gave oral presentations... Fred Fehsenfeld participated in the Atmospheric Chemistry Conference for Emerging Senior Scientists (ACCESS) meeting held in Mammoth Hot Springs, Montana, September 4-7. The Conference, held in association with the Gordon Conference that took place the following week at Big Sky, provided an opportunity

for promising new Ph.D. scientists to describe their own research, as well as a chance for them to learn about research funding opportunities and career paths. Fred and representatives of other agencies (DOE, NASA, NSF) told the participants about postdoctoral programs and career opportunities, and they were available for discussions throughout the week. Graduate student Megan Northway (Meteorological Chemistry Group) and postdoctoral CIRES scientist Aaron Swanson (NCAR and AL Tropospheric Chemistry group) attended the meeting and

Aeronomy Laboratory Contributions to the Climate Change Science Program (CCSP) Strategic Plan



Aeronomy Lab scientists Dan Albritton and David Fahey are Lead Authors of the Atmospheric Composition chapter of the recently released Strategic Plan of the Climate Change Science Program (CCSP). Other colleagues from NOAA, NASA, DOE, NSF, USDA, and the EPA rounded out the multi-agency drafting and review team.

The chapter describes current understanding, research needs, and milestones/products/payoffs on several topics: aerosol properties and distributions; sources and sinks of non-CO₂ greenhouse gases; relationships between regional pollution and global chemical and climate change; characteristics of ozone layer recovery; and couplings and feedbacks between climate change, air pollution, and ozone depletion.

The Atmospheric Composition chapter is the third chapter in the 16-chapter Strategic Plan. The Plan covers several climate-science themes, as well as overarching topics such as data management, communications, international cooperation, and program review.

The Strategic Plan was released in July of 2003. Thirteen federal agencies participated in the preparation. Hundreds of national and international scientists took part in a vigorous review process at a meeting held in December 2002, including Dan Albritton, David Fahey, Ravi, Susan Solomon, and Martin Manning of the Aeronomy Lab. A National Academy of Sciences-National Research Council committee reviewed a revised draft in early 2003.

Many other OAR scientists served as chapter authors, contributors, and reviewers of the Strategic Plan. The Strategic Plan can be viewed in its entirety at www.climate-science.gov.

Communicating Our Science continued

gave presentations. NOAA support for the ACCESS meeting and the Gordon Conference was provided by the Atmospheric Composition and Climate Project of the Office of Global Programs and was coordinated by Kea Duckenfield of OGP... Adrian Tuck attended the Royal Meteorological Society Conference September 1-5 in Norwich, U.K... Ken Gage attended the AMS 31st Conference on Radar Meteorology in Seattle in August, where he gave a presentation on the use of radar profilers in measuring precipitation parameters... David Thomson attended the National Instruments Week (NIWeek) 2003 Conference held August 13-15 in Austin, Texas... Ravi spoke about atmospheric photolytic processes at the 21st International Photochemistry Conference held in Nara, Japan, July 26-31... In early July, Ken Gage, Karen Rosenlof, and Eric Ray presented talks at the International Union of Geodesy and Geophysics (IUGG) Meeting in Sapporo, Japan... Susan Solomon gave a keynote address on climate change at the Gordon Research Conference on Solar Radiation and Climate, held in July at Colby-Sawyer College, New Hampshire... Ravi was an invited speaker at the 58th International Symposium on Molecular Spectroscopy, held at Ohio State University on June 16-18. He spoke on the cavity ring-down spectroscopy technique for measuring trace atmospheric species... Dan Murphy attended the XII International Conference on Heavy Metals in the Environment, held May 26-30 in Grenoble, France... Ann Middlebrook and Chuck Brock attended the American Association for Aerosol Research Particulate Matter Conference held April 1-4 in

Pittsburgh... Ravi was co-convenor of the Symposium on Climate-Chemistry Interactions, held April 6-11 in Nice, France, during the Joint Assembly of the European Geo-

physical Society-American Geophysical Union-European Union of Geophysics (EGS-AGU-EUG). Dave Parrish, Dan Cziczo, Adrian Tuck, Karen Rosenlof, Dave Fahey, and Tomasz Gierczak gave talks at the Joint Assembly... Ravi was one of three international cochairs of the Stratospheric Processes and their Role in Climate (SPARC)-International Global Atmospheric Chemistry (IGAC) Joint Meeting, held April 2-6 in Giens, France. Claire Granier was on the organizing committee, Karen Rosenlof was a session rapporteur, and Dave Parrish and Dave Fahey were participants. Cathy Burgdorf provided logistical and computing assistance... Susan Solomon attended the International Symposium on Climate Change, held March 31-April 4 in Beijing... On March 25, Ravi gave a presentation about the atmospheric chemistry of peroxyacetic acid at the American Chemical Society Meeting, which was held in New Orleans... George Kiladis was a co-organizer and presenter at the 7th International Conference on Southern Hemisphere Meteorology and Oceanography, held March 24-28 in Wellington, New Zealand... Ravi was an invited participant at the 24th session of the World Climate Research Programme (WCRP) Joint Scientific Committee, held in March 2003 in Reading, U.K... In March, Jim Meagher participated in the



Aeronomy Lab Scientists Serve in Leading Roles in NOAA Programs

Over the last two years, NOAA has embarked on new approaches to its planning, management, and budgeting, with the aim of improving interactions within the agency and making best use of available resources to accomplish NOAA's mission of understanding and predicting environmental changes and stewardship of coastal and marine resources. Out of that process, some 39 program areas emerged as the organizational framework for NOAA's research and operations. Aeronomy Lab scientists are serving in leadership roles in two of those 39 areas. Jim Meagher was selected to be the Manager for the Air Quality Program, which falls under the "Weather and Water" goal of the NOAA Strategic Plan. Dan Albritton is serving as Manager of the Climate Forcing component of NOAA's Climate Program, which is the endeavor that is addressing the "Climate" goal of the NOAA Strategic Plan. Most of the Aeronomy Laboratory's research falls under the two program areas headed by Jim and Dan.

Throughout NOAA, the Program Managers and their teams have been working to take stock of all of NOAA's activities in their Program topic and to propose and plan an integrated research program. In the Air Quality Program that Jim leads, OAR and the National Weather Service are the primary Line Offices. The Climate Program involves people from five NOAA Line Offices (OAR; NWS; National Environmental Satellite, Data, and Information Service; National Ocean Service; and National Marine Fisheries Service). In the Climate Forcing Program Component that Dan leads, OAR and NESDIS are the primary Line Offices.

Program Managers worked this Fall to develop their assessment of program needs and capabilities for the 2006-2010 time frame. By early January, they will develop plans for carrying out the research and will propose how to address the high-priority gaps between needs and capabilities. Final decisions on the plans and proposals will come from NOAA Headquarters in Winter/Spring of 2004, leading to the preparation of a specific NOAA budget proposal for FY 2006.

NARSTO Executive Assembly meeting in Washington, D.C. NARSTO is a partnership of air quality scientists, planners, industry representatives, and decisionmakers

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Aeronomy Lab Scientists Serve in Leading Roles in the International Ozone-Layer Assessment

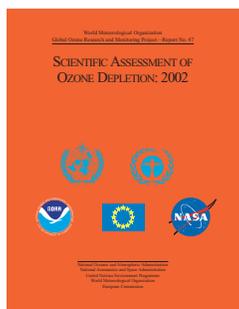
Members of the Aeronomy Laboratory have, since 1985, taken lead responsibilities in the preparation and review of the international state-of-science understanding assessment reports on the ozone layer. The most recent report, prepared in 2001/2002 and distributed in early 2003, was no exception. The reports are prepared at the request of the ~180 nations (referred to as the “Parties”) that are a part of the United Nations “Montreal Protocol on Substances that Deplete the Ozone Layer.” That 1987 international agreement requests that a Scientific Assessment Panel prepare a report approximately every four years, to update the Parties on “what is known and what is not known” about the ozone layer. Dan Albritton is one of four international Cochairs of that Scientific Assessment Panel and has served in that position since the formation of the Panels in 1989. Assessment reports are also issued by the Protocol’s two other Panels (the Environmental Effects Panel and the Technology and Economic Assessment Panel). The reports form the basis of decisions made by the Parties to protect the ozone layer (for example, the decisions regarding phase-out of the use of ozone-depleting compounds such as chlorofluorocarbons).

As in the case of past reports, Aeronomy Lab scientists served in numerous roles for the 2002 report, *Scientific Assessment of Ozone Depletion: 2002*. They were: Lead Authors (David Fahey), Coauthors (Jim Burkholder, John Daniel, Susan Solomon), Contributors (Victor Dvortsov, David Fahey, Bob Portmann), and Reviewers (Dan Albritton, John Daniel, Chris Ennis, David Fahey, Ru-Shan Gao, Ravi, Susan Solomon, Adrian Tuck). In addition, Chris

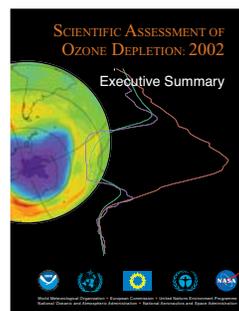
Ennis served as Coordinating Editor, and Debe Fisher led the publication layout and design of the report. Christy Sweet, retired NOAA editor, signed on as a contractor for the intense six-month period of editing and printing. The Aeronomy Lab computing staff provided computer support (Cathy Burgdorf, Walt Harrop, Rick Tisinai, Gabi Accatino, Ken Jamieson) and administrative and editorial support came from Jeanne Waters, Barb Keppler, and Suzie Milano-Schoser.

Dozens of scientists worldwide contributed to the preparation and review of the 2002 report. NOAA scientists in several NOAA Research laboratories (AL, ARL, CMDL, GFDL) and NWS are among the nearly 300 international scientists who participated.

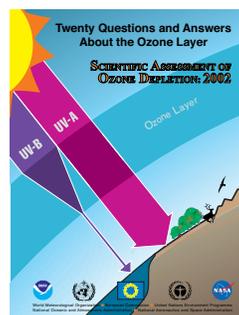
Aeronomy Laboratory scientist Dave Fahey was the Lead Author of a special component of 2002 assessment report. That component, titled “Twenty Questions and Answers About the Ozone Layer,” addresses the questions most commonly asked by students, the public, and decisionmakers regarding the depletion of the ozone layer and expectations for future recovery. The full-color, 38-page document has been distributed widely via the web, and printed copies have been sent around the world, including a distribution to the over 180 nations that are Parties to the Montreal Protocol. Students and teachers at multiple levels, from middle school through undergraduate colleges, are finding the specially designed “user friendly” graphics to be particularly valuable to their efforts to understand and teach the science regarding ozone-layer depletion.



Full Report



Executive Summary



Twenty Questions

Communicating Our Science continued

from the U.S., Mexico, and Canada... Several Aeronomy Lab scientists presented papers at the AMS 83rd Annual Meeting, held February 10-14 in Long Beach, California. Ken Gage was a session chair for the 12th Symposium on Meteorological Observations and Instrumentation that was held during the meeting... Ravi attended a meeting on Future Chemical Changes to the Atmosphere: Predictions, Surprises and Threats, held in March in London and sponsored by the Global Environmental Research Committee (GERC) of the World Climate Research Programme... Jim Meagher attended EPA’s National Air Quality Conference held February 3-5 in San Antonio... Susan Solomon attended a National Academy of Sciences Class Officer’s Briefing (CAB) meeting held in Washington, D.C., on

February 1... Several Aeronomy Laboratory scientists presented talks and posters at the Fall Meeting of the AGU, held in early December 2002 in San Francisco. Dave Parrish, Fred Fehsenfeld, Jim Meagher, and Joost de Gouw were organizers of special sessions concerning the Intercontinental Transport and Chemical Transformation 2002 (ITCT 2K2) field mission, the 2000 Texas Air Quality Study, and oxygenated volatile organic compounds... Ravi was an invited speaker at the Stratospheric Processes and their Role in Climate (SPARC) International Symposium on Stratospheric Variations and Climate, held November 12-15, 2002, at Kyushu University in Japan. His talk was on tropospheric ozone and aerosols... George Kiladis gave a talk at the Conference on the Hadley Circulation: Present, Past and Future, held in November 2002 in Honolulu...

Communicating Our Science continued

Jerry Weinstock gave a presentation on turbulence theory at a meeting of the American Physical Society's Division of Fluid Dynamics, held in November 2002 in Dallas... Karen Rosenlof, Eric Ray, and Ru-Shan Gao attended the 12th Conference on the Middle Atmosphere, held November 4-7, 2002, in San Antonio... Ken Gage was an invited speaker and a member of the program committee for the Microwave Remote Sensing of the Atmosphere and Environment conference, held October 22-27, 2002, in Hangzhou, China, as part of the SPIE Third International Asia-Pacific Environmental Remote Sensing Symposium... George Reid presented a paper at the 34th Scientific Assembly of the Committee on Space Research (COSPAR), held October 10-19, 2002, in Houston... In October 2002, Chuck Brock, Dan Cziczo, and Ann Middlebrook attended the annual American Association for Aerosol Research Meeting in Charlotte, NC... Owen Cooper, Dave Parrish, and Ravi gave presentations at the 10th Scientific Conference of the Commission for Atmospheric Chemistry and Global Pollution (CACGP)/International Global Atmospheric Chemistry Project (IGAC), held September 18-25, 2002, in Greece... Ken Gage attended the International Conference on Quantitative Precipitation Forecasting on September 2-6, 2002, at the University of Reading, U.K.

• *Research Workshops:* Ravi, Dave Fahey, Ru-Shan Gao, Tim Marcy, and Owen Cooper gave talks and several other AL scientists participated in the NCAR Upper Troposphere-Lower Stratosphere Workshop, October 27-28 in Boulder... On October 27-31, Ken Gage participated in the NASA Precipitation Science Team Meeting in Washington, D.C... Fred Fehsenfeld, Dave Parrish, and Tom Ryerson gave talks at the NARSTO Emissions Inventory Workshop, October 14-17, in Austin, Texas...

George Kiladis gave a presentation on monsoon variability over the southwestern U.S. at the NOAA 28th Annual Climate Diagnostics and Prediction Workshop, held in October 2003 in Sparks, Nevada... Leslie Hartten and George Kiladis gave poster presentations at the U.S. Climate Variability and Predictability (CLIVAR) Pan

American Workshop held in September in Boulder... Dave Parrish and Ravi attended the 11th session of the Stratospheric Processes and their Role in Climate (SPARC) Scientific Steering Group meeting in Frankfurt, September 20-26... Cathy Burgdorf, Gabi Accatino, Walt Harrop, Donna Sueper, and Ken Aikin attended the 2003 NOAA WebShop in Longmont, Colorado, on June 3-5... Susan Solomon attended the Community Climate System Modeling (CCSM) Workshop and the meeting of the CCSM Advisory Board, both held in Breckenridge, Colorado, in late June. She also participated in the Workshop on the Theory and Use of Regional Climate Models, June 2-6 in Trieste, Italy... Several AL scientists attended the 2002 New England Air Quality Study Data Workshops, held February 13 in Boulder and May 28-30 in Durham, New Hampshire. The

meetings were first data-sharing opportunities for scientists who participated in the summer 2002 field study, as well as settings for planning discussions concerning the summer 2004 field study in New England... Ken Gage and Wally Clark gave presentations at the 10th International Workshop on Technical and Scientific Aspects of MST Radar, held May 13-20 in Piura, Peru... George Kiladis gave lectures during the Cooperative Program for Operational Meteorology, Education, and Training (COMET) series of Climate Variability Workshops for NWS scientific and operations officers, at NCAR in Boulder on April 28 and again on July 30... On April 22-25, several Aeronomy Lab scientists met with colleagues

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IPCC Working Group I Completes Major Steps in Planning for the Fourth Assessment Report



Susan Solomon, elected in April 2002 to a five-year term as the Cochair of Working Group I (Science) of the Intergovernmental Panel on Climate Change (IPCC), led a busy slate of activities thus far to plan for the IPCC's Fourth Assessment Report. Scheduled for completion in 2007, the assessment will include state-of-understanding reports from each of the three working groups of the IPCC (WG I, Science; WG II, Impacts, Adaptation, and Vulnerability; and WG III, Mitigation). A demanding series of meetings during the past year resulted in a final draft of the chapter outline for the WG I report, formally approved by governments at a plenary in Vienna in November 2003. Chapter Lead Authors will be selected in the coming months, and the first drafting meeting is planned for September 2004.

In addition during this last year, Task Group meetings were held on the topic of scenarios for climate impact assessment, and Susan was co-convenor of an Expert Meeting on Terrestrial Carbon Stocks that took place in Geneva in July. Work on an IPCC Special Report on Ozone and Climate also began, and WG I will be hosting the next Lead Authors meeting for that report in Boulder in January.

Assisting Susan is the WG I Technical Support Unit housed at the Aeronomy Laboratory, headed by Martin Manning and assisted by Tahl Kestin (project scientist) and Scott Longmore (associate scientist). Dale Kellogg has also been a key player in the TSU over the past year but has recently taken a new position with the University Corporation for Atmospheric Research.

Communicating Our Science continued

at the Cooperative Institute AIRMAP (Atmospheric Investigation, Regional Modeling, Analysis, and Prediction) in Durham, New Hampshire, to discuss collaborations and plans for the 2004 New England Air Quality Study (NEAQS-2004)... Michael Trainer attended the Megacity Impact on Regional and Global Environment (MIRAGE) Steering Committee Meeting held in Mexico City in early April 2003. MIRAGE is a new initiative of NCAR's Atmospheric Chemistry Division. Michael serves on the steering committee... Ken Gage participated as an invited panel member at a NASA meeting in March to evaluate Precipitation Measurement Mission research opportunities... Several staff in the Meteorological Chemistry group and the Computing and Networking Resources Group participated in the first science team meeting of the 2002 mission of CRYSTAL-FACE (Cirrus Regional Study of Tropical Anvils and Cirrus Layers – Florida Area Cirrus Experiment). The meeting was held February 24-28 in Salt Lake City... Cathy Burgdorf and Gabi Accatino attended the MacWorld Expo in San Francisco, January 6-10... Dave Parrish attended the Sino-U.S. Workshop on Dust Storms and Their Effect on Human Health, held in Raleigh, North Carolina, on November 25-26, 2002... On November 20-21, 2002, Eric Ray attended a workshop of the NASA Convection and Moisture Experiment (CAMEX) in Huntsville, Alabama... Dan Albritton attended a Science Team meeting of the Atmospheric Brown Cloud (ABC) project, held November 4-5, 2002, in San Diego... In October 2002 in Salerno, Italy, Adrian Tuck participated in the Workshop on Prebiotic Chemistry and Early Evolution... Dave Parrish and Adrian Tuck gave presentations at the EMEP/German/US Workshop on Hemispheric Air Pollution: Trends and Intercontinental Transport of Photooxidants, Particles and Their Precursors across the Northern Hemisphere, held October 7-9, 2002, in Bad Breisig, Germany. Dave also participated in a workshop the following week on Ozone and Particles: Policy and

Science, where he spoke on evaluating emissions through ambient observations. EMEP is the Cooperative Programme for Monitoring and Evaluation of the Long-Range Transmission of Air Pollutants in Europe.

- *Invited Lectures and Seminars:* On October 2, George Kiladis gave a seminar on “Monsoons of the Southwest” at the Earth and Environmental Sciences Department of New Mexico Technical University in Socorro... On September 26, Erik Richard presented a talk at the Chemical Physics Colloquium of the Joint Institute

Chet Koblinsky, New Head of NOAA's Climate Program, Visits NOAA-Boulder

Chet Koblinsky, who joined NOAA this November to lead the NOAA Climate Program, visited the NOAA-Boulder climate labs November 5-7. In-depth presentations and discussions took place with the Aeronomy Laboratory, Climate Diagnostics Center, and Climate Monitoring and Diagnostics Laboratory, as well as overview presentations from the Air Resources Laboratory's Surface Radiation Research Branch, Environmental Technology Laboratory, Forecast Systems Laboratory, and the Paleoclimatology group of the National Environmental Satellite, Data, and Information Service/National Climatic Data Center. An in-depth visit to the Cooperative Institute for Research in Environmental Sciences was also part of the three-day itinerary.

The opportunity for such an extensive face-to-face meeting is especially valuable at this early stage of Dr. Koblinsky's new work with NOAA. As was sought after by Dr. Koblinsky, the visit made it possible to quickly become familiar with NOAA-Boulder's very sizeable research effort on climate. It also served as a kickoff for the ongoing exchange of ideas and information that will occur as a part of NOAA's Climate Program.

for Laboratory Astrophysics (JILA) at CU. He spoke on the development and use of aircraft in situ instruments for atmospheric research... Susan Solomon gave a keynote lecture at the University of East Anglia in Norwich, U.K., in September... Ravi gave a lecture about climate-chemical interactions on June 25 at the Swiss Federal Institute of Technology in Zurich... Jim Burkholder gave a seminar at NCAR on June 23, on the topic of laboratory studies of iodine oxide homogeneous nucleation... On June 11, Pat Haertel presented a seminar at CDC on the dynamics of equatorial two-day disturbances.... In May, Ravi gave a seminar on hydroxyl radical (OH) complexes at the Indian Institute of Science in Bangalore... On May 15, Patrick Haertel gave a lecture on “Two-Day Equatorial Disturbances” at the Massachusetts Institute of

Technology... On May 13, Greg Frost gave a presentation on tropospheric chemistry at Ohio State University... Ken Gage gave an invited lecture on Doppler radar wind profilers at the Geophysical Institute of Peru (in Lima) on May 12... Ann Middlebrook gave an invited seminar at the Environmental Chemistry and Toxicology Department, University of California at Riverside, on May 7... On April 22, Ravi gave an invited seminar at the University of Florida at Gainesville, concerning interactions between climate and atmospheric chemistry... Ken Gage was an invited keynote speaker at the NCAR Workshop on Radar Development and Applications, held April 23-25 in Boulder. He also gave the Hydrologic

Communicating Our Science continued

Sciences and Water Resources Engineering Seminar at CU-Boulder on April 9. In both talks, Ken discussed the use of radar profilers in wind and precipitation research... George Kiladis presented a seminar on equatorial waves at the Department of Earth and Atmospheric Sciences of the State University of New York on April 14... Ravi gave the Bryce Crawford Lecture on March 14 at the University of Minnesota Chemistry Department. He discussed climate-chemistry interactions... Susan gave the Georgina Frances Michel Memorial Lecture on March 17 at the Department of Chemistry and Biochemistry, University of Colorado. Her talk, "A Chemist Looks at Climate Change," discussed a range of human influences on the Earth's atmosphere and climate system and offered a perspective on key uncertainties as well as possible future climate behavior in the 21st Century. Susan also gave the 7th Annual Louis Byrne Slichter Lecture at the University of California-Los Angeles on March 11, speaking on her research related to Antarctica. Slichter was the founding director of UCLA's Institute of Geophysics and Planetary Physics... Ravi gave an invited talk at the Berkeley Atmospheric Sciences Center on November 8, 2002, on the topic of nitrogen oxide chemistry. He also spoke at Emory University in Atlanta on October 22, 2002, about hydroxyl radical (OH) complexes. He discussed that topic at the CU Chemical Physics Seminar on February 28.

To Media: Piers Forster fielded several interviews with national and international media in association with the paper he coauthored with Susan Solomon on the "weekend effect" that they discovered in their analysis of temperature data. See the box on page 4 of this newsletter for more details... In June, Jim Meagher was interviewed in a National Public Radio segment on air quality in the New England region... David Fahey provided a June 30 web response for *Scientific American Online* to a public inquiry on why there is more ozone loss in polar regions of the

Northern and Southern Hemisphere... An article featured Tommy Thompson in the April 17 issue of the *IEEE Spectrum Careers*. The article was titled "Building instruments that let atmospheric scientists dissect the weather"... In January, Dave Fahey was featured in an Earthwatch Radio segment on ozone-layer recovery and the findings of the latest (2002) international scientific assessment of ozone depletion. Also, in November 2002, he provided scientific

perspectives for an article on contrails in *The Durango Telegraph*, and he did a short radio interview in December with Durango station KDVR.

To Industry: Susan Solomon attended the 14th Annual Earth Technologies Forum held April 22-24 in Washington, D.C. The ETF is an international conference designed to provide up-to-date scientific information about the major environmental issues affecting industry today (climate and ozone depletion). Susan gave a plenary presentation about the scientific assessments on both of those topics... On November 20, Susan Solomon gave a presentation on the Intergovernmental Panel on Climate Change (IPCC) to the British Petroleum/American Petroleum Institute meeting in Houston.

To Students and Teachers: On July 1, Leslie Hartten attended a workshop on Scientific Inquiry in the K-12 Classroom,

offered through a collaborative effort of CIRES Outreach, the CU Science Discovery project, and the Space Sciences Institute... David Fahey gave a presentation on ozone depletion to 40 visiting high school juniors in the international baccalaureate science group from Palmer High School (Palmer, Colorado) on May 7... In April, Susan Solomon was a featured speaker at the Bring Your Child to Work Day held at IBM in Boulder. Over 800 children took part in the event, with several hundred hearing Susan's talk "Going to Work in Antarctica." At the DOC campus in Boulder, Debe Fisher was a member of the organizing committee for the Bring Your Child to Work Day event, helping with registration, organization, and preparation of materials... George Kiladis gave class lectures on equatorial

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Susan Solomon Chairs National Academy Panel on Gender Balance

Susan Solomon recently chaired the National Academy of Sciences "Committee on Nomination and Election in the 21st Century," which examined the issues of election of women and gender equity in the National Academy of Sciences. The Committee's charge was to recommend ways to increase the number of women nominated and elected as NAS members; to suggest new ways to identify potential future women candidates; and to determine new approaches to raising the visibility of women scientists so that the potential for nomination would be enhanced.

Over the period of about a year, Susan and nine other NAS committee members discussed the issues. The Committee arrived at a set of recommendations for action and presented their findings to the NAS Council in August 2002. Included among the recommendations are ideas for increasing gender balance within the Sections, Subcommittees, and Nominating Committee of the NAS; new mechanisms for encouraging the election of more women as foreign associates of the NAS; and new and broadened approaches to seek out potential women candidates.

The Council accepted nearly all of the recommendations, which are now being implemented within the NAS.

Communicating Our Science continued

waves at the University of Colorado and at the Massachusetts Institute of Technology in April, February, and November... Several Aeronomy Laboratory scientists served as judges at science fairs in the local schools during January and February: Leslie Hartten (Eisenhower Elementary); Susan McCaffery, Steve Ciciora, and Owen Cooper (Rocky Mountain School for the Gifted and Talented); and Paul Goldan and Leslie Hartten (Burbank Middle School)... In September 2002, Susan Solomon served on the board of advisers for a project with the National Academy of Sciences to develop a biography series featuring women scientists. The series is aimed at reaching middle school girls and fostering their confidence, interest, and enthusiasm for pursuing careers in science.

To the Public: The Chemical Heritage Foundation in Philadelphia has included Susan Solomon in an exhibit on Women in Chemistry. The exhibit will be offered both online (www.chemheritage.org) and in a traveling format in late 2003/early 2004.

To Our Visitors: Min Shao, an atmospheric scientist at Beijing University, visited the Aeronomy Laboratory for a week in early October. He was here to discuss research and future collaborations on the topic of air quality... On September 17-19, fourteen scientists of the Chinese Meteorological Agency visited NOAA-Boulder. Chris Ennis hosted the Aeronomy Laboratory portion of the agenda... Neil Shapiro (Branch Chief, DOC Budget Office), Everett Whitely (NOAA Budget Office), and Mark Brown (Chief Financial Officer, NOAA Research) visited NOAA-Boulder and MASC on September 10. Dan Albritton gave presentations on the Aeronomy Lab's climate and air quality research activities. Mark Brown had also visited the Labs in late July... August 19 and 20 were the dates of the National Research Council Associates Program's visit to NOAA-Boulder. Judy Nyquist (Program Administrator), Lisa Bevell (Program Coordinator), and Sharon MacLean (NOAA-NRC Representative) met with lab personnel, advisors, and associates... Gerhard Wotawa, of the Comprehensive Nuclear Test-Ban Treaty Organization in Vienna, visited the Theoretical Aeronomy group in late June 2003, to discuss research on atmospheric transport and chemistry... On June 10, Bonnie Morehouse (Director of the NOAA Office of Program Analysis and Evaluation) and Joyce Wood (Director of Strategic Planning, NOAA Office of Program Planning and Integration) visited the NOAA-Boulder Labs and Centers. Dan Albritton hosted the Aeronomy Lab's portion of the agenda. These offices are playing key roles in NOAA's new planning and management processes... Ravi hosted the Aeronomy Lab segment of the May 28 visit of Tim
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Minority-Emphasizing Programs Help Aeronomy Lab Foster Young Scientists' Careers



This past summer, two students came to the Aeronomy Lab through programs that seek to increase the participation of minorities in the atmospheric sciences. Maya Nunley, a chemistry major now in her senior year at Clark Atlanta University, came under the NOAA Educational Partnership Program with Minority Serving Institutions (EPP/MSI) program to work with Steve Brown of the Aeronomy Lab's Atmospheric Chemical Kinetics group. She completed a two-month research project on the cavity ring-down instrument for atmospheric trace species analysis. In the Tropical Dynamics and Climate group, Leslie Hartten served as the scientific mentor this summer for Melissa Burt, a protégé with the Significant Opportunities for Atmospheric Research and Science (SOARS) program. Melissa is an undergraduate meteorology major at Millersville University in Pennsylvania. She completed a project involving analyses of wind profiler data taken in the tropical Pacific Ocean region. SOARS, a program for undergraduate and graduate students, was established by the University Corporation for Atmospheric Research through a partnership with NOAA, NSF, NASA, DOE, and the UCAR university community.

The Aeronomy Lab has another connection to the EPP/MSI program mentioned above. Dave Fahey serves on the Scientific Advisory Panel of the NOAA Cooperative Remote Sensing Science and Technology (CREST) Center, which is located at the City College of the City University of New York. CREST is one of the four Cooperative Science Centers of NOAA's EPP/MSI program. The Centers conduct research consistent with NOAA's mission, while fostering the increased involvement of underrepresented minorities in NOAA's research.

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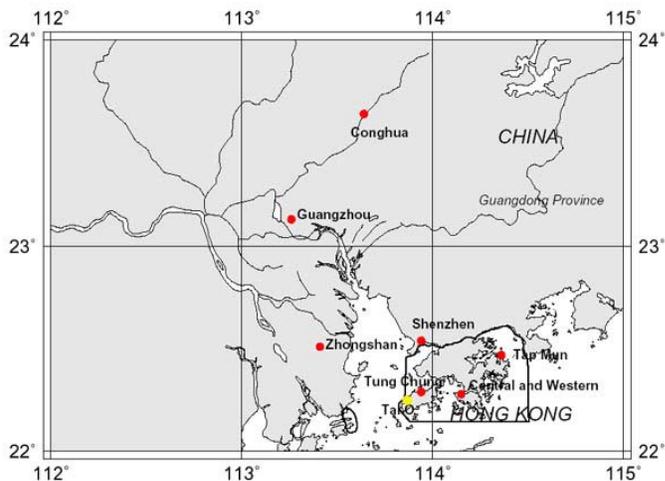
Jim Meagher Serves in National and International Air Quality Science Advisory Roles

The “word is out” on the Aeronomy Lab’s research on air quality, and information customers have sought the Lab’s scientific expertise in several ways during the past year. Elsewhere in this newsletter, we have described major efforts to provide an “air quality information service” to the State of Texas (see page 3), the New England region (see page 6), and the NARSTO air quality community (via the fine-particle assessment report; see page 9). Here, we highlight two advisory roles taken by Jim Meagher during the past year, both of which called upon the research of the Aeronomy Lab’s air quality scientists to provide the information needed for planning purposes.

In the Health-Research Sector: Jim served as a scientific advisor at a recent workshop convened by the National Environmental Respiratory Center (NERC). The February 27-28 workshop, held in Albuquerque, discussed approaches for generating a “coal combustion emissions” atmosphere for exposing animals for toxicological studies. Jim’s scientific expertise was sought with regard to identifying the chemical characteristics of pollution that is associated with coal-burning activities, so that realistic experimental conditions could be achieved in the Center’s research on the respiratory effects of inhaled complex pollution atmospheres. The Center has previously studied exposure effects of diesel and gasoline emissions and wood smoke. NERC has identified coal emissions as perhaps the most challenging set of issues it has tackled, in part because the fresh, diluted “top-of-stack” emissions are not the environment of primary concern. The Aeronomy Laboratory’s past research on the downwind transformation of the emissions from coal-fired power plants in the eastern U.S. is thus particularly relevant to the NERC study.

The National Environmental Respiratory Center is a government-industry program of information and laboratory research to improve understanding of the relationship between complex mixtures of environmental (outdoor) air pollutants and human health. It has sought the advice of a broad base of scientific experts to aid its design of laboratory studies of the effects of selected inhaled complex pollution atmospheres.

In International Air Quality Field Experiments: Jim also is an invited member of the Scientific Advisory Committee of the Hong Kong and Pearl River Delta Pilot Air Monitoring Project, which is carrying out ozone/fine-particle studies to provide information to more effectively manage the air quality of that region. The ~2-year project is a collaborative effort involving several partners in China and the U.S. The broad scientific aims of the project are to enhance scientific understanding of air quality problems in the Hong Kong/Pearl River Delta region, especially with regard to ozone and fine particles. In addition to the scientific objectives, the project seeks to create an alliance among key stakeholders in the region’s public, private, and academic sectors, to improve their ability to work cooperatively in developing a long-term air quality management capacity in Hong Kong and Mainland China. The Scientific Advisory Committee on which Jim is serving is a key element of the collaborative framework among the stakeholders to facilitate long-term air quality management for the region. The Committee will advise and audit the scientific research of the project and will review the scientific reports on ozone, fine particles, and organic chemical tracers that are among the expected outcomes of the project. The parallels (e.g., sea-breeze influences) and contrasts (e.g., substantially different sources and emissions) between the U.S. and Asian settings will provide an interesting additional scientific perspective that is of relevance to NOAA’s air quality research. A collaboration with Chinese scientist Shao Min of Peking University has grown as a result of the association. Shao Min will come to the Aeronomy Laboratory to take part in the New England Air Quality Study in summer 2004. It is hoped that the visit will provide a useful scientific perspective for an extensive air quality field research effort that Chinese scientists are planning for the 2006-2008 time frame.



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Keeney, NOAA Deputy Assistant Secretary for Oceans and Atmosphere, to NOAA-Boulder... On May 8, Chris Ennis hosted the visit of Joyce Gross (NOAA's Office of Education and Sustainable Development) and Jason Goldberg (NOAA Research External Affairs Team)... Scott Smullen, Deputy Director of NOAA Public Affairs, visited NOAA-Boulder on February 18 and was given an Aeronomy Lab tour by Chris Ennis... Randall Martin (formerly with Harvard University and now with Dalhousie University in Nova Scotia) visited the Tropospheric Chemistry group for two days in February 2003 to discuss tropospheric NO₂ measurements... Olga Popovicheya, of Moscow State University, visited the Atmospheric Chemical Kinetics group for a few days last December to discuss collaborative research on soot in the atmosphere. The discussions resulted in the subsequent two-month visit of her student, Katia Lukhovitskaya, in Fall of 2003 to do research with the group.

Through Service on Scientific Panels and Boards: Dan Albritton and Jim Meagher continue in their leadership roles on the Air Quality Research Subcommittee (AQRS) of the Committee on Environment and Natural Resources (CENR). The AQRS promotes interagency cooperation in the planning and coordination of the Nation's air quality research. Dan is the Vice Chair of the AQRS, and Jim is a coordinator of its Particulate Matter Research Coordination Working Group. Jeanne Waters coordinates and supports the AQRS& PM working group meetings... On October 11, Ravi traveled to Irvine, California, for a nominating committee meeting of the National Academy of Sciences. Susan Solomon and Ravi attended the 140th Annual Meeting of the members of the NAS, held April 26-29 in Washington, D.C... Adrian Tuck attended the Core Strategic Measurements for Atmospheric Science (COSMAS) Steering Committee Meeting in London, held October 8-11. Adrian chairs the Steering Committee, which sets research directions and awards funding within the COSMAS, a program of the U.K.'s Natural Environment Research Council... Ravi attended a September 2003 meeting in Frankfurt, Germany, as well as a November 2002 meeting in Kyoto, Japan, of the Scientific Steering Committee of the Stratospheric Processes and their Role in Climate (SPARC) program. Ravi co-chairs the Committee... Dave Parrish attended the International Global Atmospheric Chemistry Project (IGAC) Scientific Steering Committee meeting held in Banff, Canada, June 19-24, 2003. Dave is now a member of the IGAC Scientific Steering Committee... George Kiladis is a member of the NOAA THORPEX Science Steering Committee. THORPEX (THE Observing-system Research and Predictability EXperiment) is an international research program aimed at improving weather forecasting... David Fahey is serving on the Scientific Advisory Panel of

the NOAA Cooperative Remote Sensing Science and Technology (CREST) Center. See the special box on page 16 for more information... In May, Ravi was an invited reviewer in the Helmholtz Society's review of atmospheric sciences programs of various German scientific institutes... Karen Rosenlof and Susan Solomon served on the Review Panel for the Naval Research Laboratory's Remote Sensing Program. The review meeting took place in late April at NRL in Washington, D.C... In April, George Kiladis began a three-year term as Associate Editor of *Dynamics of Atmospheres and Oceans*. His term as Editor of *Journal of Atmospheric Sciences* ended in January 2003. January 2004 will mark the end of George's three-year term as Chair of the AMS Committee on Meteorology and Oceanography of the Southern Hemisphere... In February, Leslie Hartten began a three-year term on the AMS Board of Women and Minorities... In November 2002, Susan Solomon served as a member of the Review Panel for the NOAA Climate and Global Change Program. She has served on the Panel for ten years... In September 2002, Susan Solomon participated in the review of the International Arctic Research Center in Fairbanks, Alaska.

DOWN THE ROAD



December 8-12: Fall Meeting, American Geophysical Union, San Francisco. Aeronomy Lab scientists are co-chairs of several sessions and presenters in many sessions at the meeting.

December 17: Aeronomy Laboratory Holiday Party, Mt. Evans Room, Jeffco Airport.

January 11-15: 84th Annual Meeting of the AMS, Seattle, Washington.

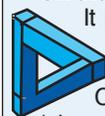
June 1-8: Quadrennial Ozone Symposium, Kos, Greece. Claire Granier is on the Scientific Programme Committee.

August 1-6: 3rd General Assembly, Stratospheric Processes and their Role in Climate (SPARC), Victoria, British Columbia, Canada. Ravi is the Scientific Program Committee Cochair.

Upcoming Aeronomy Lab seminars:

03 December	Jose Jimenez	University of Colorado
28 January	Bob Yokelson	University of Montana
13 April	Heather Allen	Ohio State University

On the Air! is a publication of the NOAA Aeronomy Laboratory. It is posted on the World Wide Web at www.al.noaa.gov. Please send comments, suggestions, or questions to: Chris Ennis (phone 303-497-7538; email Christine.A.Ennis@noaa.gov) or Debe Dailey-Fisher (phone 303-497-6893; email Debra.A.DaileyFisher@noaa.gov).





Aeronomy Laboratory

November 2003



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